REMARKS

Claims 1-5, 8, 10, 12, 14, 16-23 and 31-34 are pending in the application.

The issues outstanding in this application are as follows:

- Claims 1-5, 8, 10, 12, 14, 17-23 and 31-34 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Jordan (U.S. Patent No. 5,826,369) in combination with Reid (U.S. Patent No. 4,981,495) or Reid (U.S. Patent No. 4,941,968).

I. Claims 1-5, 8, 10, 12, 14, 17-23 and 31-34; 35 U.S.C. § 103(a)

Claims 1-5, 8, 10, 12, 14, 17-23 and 31-34 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Jordan (U.S. Patent No. 5,826,369) in combination with Reid (U.S. Patent No. 4,981,495) or Reid (U.S. Patent No. 4,941,968). The Applicants respectfully traverse.

Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), controls the consideration and determination of obviousness under 35 U.S.C. 103(a); *KSR Int'l Co. v. Teleflex Inc.,* 127 S. Ct. 1727, 1734-35, 167 L. Ed. 2d 705, 715 (U.S. 2007). The four factual inquires enunciated therein for determining obviousness are: (1) determining the scope and contents of the prior art; (2) ascertaining the differences between the prior art and the claims in issue; (3) resolving the level of ordinary skill in the pertinent art; and (4) evaluating evidence of secondary considerations.

In order to assess the scope and content of the prior art properly, a thorough understanding of the invention must be acquired by studying Applicants' claims and the specification. M.P.E.P. § 2141. Thus, the inquiry begins with construction of Applicants ' claims, in which the claims as presented herein are relied upon. Next, when ascertaining the differences between the prior art and the claims at issue, both the invention and the prior art references as a whole must be considered, and ***all*** claim limitations must be considered when determining patentability of Applicants invention. M.P.E.P. §§ 2141; 2143. When this is properly done in this case, as shown below, it becomes clear that differences exist that preclude obviousness. And finally, the test for obviousness requires identification of a

reasonable basis for combining the claimed elements in the claimed fashion. *KSR*, 127 S. Ct. at 1741; M.P.E.P. §2143. As shown below, this requirement is not met in this case, and no *prima facie* case for obviousness is made.

A. <u>A fuel additive</u>

Claims 1, 2 and 34 are directed toward "A fuel additive". Jordan teaches **a fuel additive** made of beta-carotene, chlorophyll, jajoba oil and ethoxylated castor oil. Jordan also provides a teaching that the fuel may be diluted with gasoline, diesel fuels, xylene, toluene, cyclic hydrocarbons and other liquids including most organic solvents. However, Jordan does not teach a fuel additive that comprises compounds such as 2,2,4-trimethyl-6-ethoxy-l,2-dihydroquinoline.

In summary, Jordan teaches:

> (1) a fuel additive: made of beta-carotene, chlorophyll, jajoba oil and ethoxylated castor oil; and
>
> (2) a fuel diluted with gasoline, diesel fuels, xylene, toluene, cyclic hydrocarbons and other liquids including most organic solvents; and
>
> (3) an additized fuel (a fuel additive + fuel) made of beta-carotene, chlorophyll, jajoba oil and ethoxylated castor oil, and diluted with gasoline, diesel fuels, xylene, toluene, cyclic hydrocarbons and other liquids including most organic solvents.

The fuel additive is in Jordan **<u>NOT</u>** diluted. The fuel additive is made of 100% beta-carotene, chlorophyll, jajoba oil and/or ethoxylated castor oil. Applicants would like to point out that nowhere in the Jordan reference does it teach beta-carotene plus a compound like 2,2,4-trimethyl-6-ethoxy-l,2-dihydroquinoline. So with respect to claims 1, 2 and 34, Jordan does not teach **<u>an additive</u>** made of beta-carotene and a 2,2,4-trimethyl-6-ethoxy-l,2-dihydroquinoline like compound. Reid does not cure this defect.

Reid teaches a fuel additive comprising an alkyl 1,2-dihydroquinoline compound, dimer, trimer or polymer thereof. Optionally, a hindered phenol may be conjointly used with the quinoline compound. Beta-carotene is not a hindered phenol, nor is it an alkyl 1,2-dihydroquinoline compound. Reid teaches that alkyl 1,2-dihydroquinoline compounds (additive) may be added to gasoline and other fuels (fuel) in an amount of 1 to 10,000 parts

per million gasoline. Reid teaches an additive that is 100% alkyl 1,2-dihydroquinoline compounds, dimers, trimers or polymers thereof plus a hindered phenol. Reid does not teach that the additive can be combined with anything else to from an additive. Therefore the additive in Reid is not diluted and is made of 100% alkyl 1,2-dihydroquinoline compounds, dimers, trimers or polymers thereof plus a hindered phenol, and **NOT an additive** made of beta-carotene and 2,2,4-trimethyl-6-ethoxy-l,2-dihydroquinoline.

In summary, Read teaches:

> (1) **an additive:** alkyl 1,2-dihydroquinoline compounds, dimers, trimers or polymers thereof plus a hindered phenol
>
> (2) **the fuel**: gasoline and other fuels
>
> (3) **the additized fuel (additive + fuel):** alkyl 1,2-dihydroquinoline compounds and/or a hindered phenol (additive) plus gasoline and other fuels (fuel) in an amount of 1 to 10,000 (additive) parts per million gasoline (fuel).

There is no teaching suggestion or motivation for one of ordinary skill in the art to combine the 100% alkyl 1,2-dihydroquinoline compounds, dimers, trimers or polymers thereof of Reid with the 100% beta-carotene, chlorophyll, jajoba oil and/or ethoxylated castor oil of Jordan to arrive at **an additive** that comprises beta-carotene and 2,2,4-trimethyl-6-ethoxy-l,2-dihydroquinoline. The Examiner is relying upon the teachings for **a fuel** to arrive at the mixture of beta-carotene and 2,2,4-trimethyl-6-ethoxy-l,2-dihydroquinoline. Claims 1, 2 and 34 are directed toward **an additive**. The only teaching for this combination of compounds as **a fuel additive** is the pending application itself which cannot provide the teaching suggestion or motivation for obviousness. *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 221 USPQ 929 (Fed. Cir. 1984). *See also In re Dow Chem. Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988) (both the suggestion and reasonable expectation of success must be found in the prior art and not in the applicant's disclosure).

The combination of Jordan and Reid teaches:

Jordan	Reid	Jordan and Reid
a fuel additive: 100% made of beta-carotene, chlorophyll, jajoba oil and ethoxylated castor oil	an additive: 100% alkyl 1,2-dihydroquinoline compounds, dimers, trimers or polymers thereof plus a hindered phenol	**Does not teach an additive that can be combined without changing the principle of operation of the cited art**
a fuel diluted with gasoline, diesel fuels, xylene, toluene, cyclic hydrocarbons and other liquids including most organic solvents	the fuel: gasoline and other fuels	Gasoline, etc
an additized fuel (a fuel additive + fuel) made of beta-carotene, chlorophyll, jajoba oil and ethoxylated castor oil, and diluted with gasoline, diesel fuels, xylene, toluene, cyclic hydrocarbons and other liquids including most organic solvents.	the additized fuel: alkyl 1,2-dihydroquinoline compounds and/or a hindered phenol (additive) plus gasoline and other fuels (fuel) in an amount of 1 to 10,000 (additive) parts per million gasoline (fuel)	The additized fuel; comprising (1) the additive of Jordan, (2) the additive of Reid, (3) gasoline. **NO TEACHING THAT EITHER ADDITIVE CAN BE COMBINED TO GIVE AN ADDITIVE COMPRISING BETA-CAROTENE AND ALKYL 1,2-DIHYDROQUINOLINE COMPOUNDS**

Although there is textual support for adding an additive to gasoline wherein the gasoline includes other components besides thousands or millions of compounds normally found in gasoline, there is no support for combining the two additives to form one additive. The fuel and the additive are two different compositions and must be treated as such. Can a car run off of an additive, or does the car need fuel to run?

B. The additized fuel

Claims 20 and 21 are directed toward an additized fuel (**additive + fuel**). Since the combination of Jordan and Reid does not give the additive disclosed in claims 20 and 21, the combination of Jordan and Reid cannot arrive at the additized fuel of claims 20 and 21 for the reasons stated above.

The way that the examiner arrives at the claimed invention is fundamentally flawed. The Examiner arrives at the claimed invention using the following reasoning: the additized fuel comprises (1) the additive of Jordan, (2) the additive of Reid, and (3) gasoline where the additive of Jordan only comprises beta-carotene and the additive of Reid only comprises alkyl 1,2-dihydroquinoline compounds. The Examiner then reasons, that by combining the additive of Reid and the additive of Jordan one of ordinary skill in the art would arrive at the claimed invention. The flaw with respect to the additive is discussed above. As stated above, the fuel and the additive are two different compositions and must be treated as such.

Additionally, the asserted additive plus the gasoline does not arrive at the claimed additized fuel for a number of reasons. The most apparent reason is that the quantities and the stoichiometric amounts of additive disclosed Reid and Jordan are nowhere close to the quantities and stoichiometric amounts claimed.

Although there is **no factual basis** for the assertion, the Examiner asserts that the stoichiometric amounts claimed are disclosed in the cited art. Jordan teaches that the amount of total additive used to treat the fuels is between 0.1% to 10% v/v. (v/v denotes volume per volume) (column 3, lines 22-26). For example, 10% v/v of 1 gallon of gasoline (3,785.4 mL) is 378.5 mL of additive per gallon of gasoline, and 0.1% v/v of 1 gallon of gasoline is 37.85 mL of additive per gallon of gasoline. The density of beta-carotene is 0.941 ± 0.06 g/cm^3 so approximately 0.1% v/v of beta-carotene/gasoline is roughly 37.85 grams of beta-carotene in 1 gallon of gasoline, and 10% v/v of beta-carotene/gasoline is roughly 378.5 grams of beta-carotene. Claims 1, 2, 20, 21 and 34 recite the limitation "a ratio of grams of beta-carotene to grams of 2,2,4-trimethyl-6-ethoxy-1,2-dihydroquinoline in the additive is from about 20:1 to about 1:1." The lower limit for the amount of grams of beta-carotene disclosed in Jordan is 37.85 grams and the upper limit of grams of beta-carotene disclosed in the present disclosure is roughly 4 grams (See Table 7, US 2005/0160662). Jordan discloses about 10 to 100 times more beta-carotene per gallon than the pending application.

On page 2 and 3 of the Action, the Examiner asserts that Reid teaches that alkyl 1,2-dihydroquinoline compounds (additive) may be added to gasoline and other fuels (fuel) in an amount of 1 to 10,000 parts per million gasoline, which converts to 0.000001 to 0.01 times 100 (to result in percent) is 0.0001 to 1.0%. Notably absent are the units. What does this

mean without the units? The appropriate units are molar units since parts per million compares particles to particles. So for every one particle of alkyl 1,2-dihydroquinoline compounds (additive) there are 1 million total particles of gasoline. **Assuming** that:

(1) the density of gasoline is 0.71–0.77 g/cm^3 **(Assumption #1 – naphthalene has a density of 1.14 g/cm^3, 1,2,4-trimethlybenze has a density of 0.876 g/cm^3, …no real way to know the true density)**

(2) 1 mL is equal to 1 cm^3 **(Assumption #2, this is true for water at standard temperature and pressure but this is not true for all other liquids)**

(3) 1 gallon is 3785.4 mL

(4) using the equation: (volume x density = mass), **(Assumption #3 – this equation is for a pure liquid not a mixture)**

(5) the mass of 1 gallon of gasoline is between 2,687.6 and 2,914.7 grams (**Assumption #4 – guess based upon Assumptions 1-3**).

(6) the average molecular weight of gasoline is 108 g/mol (**Assumption #5**)

(7) a gallon of gasoline is between 24.8 and 27 moles of gasoline (it took at least 5 assumptions to arrive at this number)

This creates a range based upon 1 to 10,000 ppm of 0.0000248 (0.000001 x 24.8) to 0.27 (0.01 x 27) moles of additive per gallon of gasoline. 2,2,4-trimethyl-6-ethoxy-l,2-dihydroquinoline has a molecular weight of 217.314 grams per mole. This gives a range of 0.005 to 58.67 grams of 2,2,4-trimethyl-6-ethoxy-l,2-dihydroquinoline per gallon of gasoline. There is nothing (no factual basis) in the Reid reference (or any cited art) that would lead one of ordinary skill in the art to arrive at the above used parameters for gasoline which calls for (1) a pure liquid with a density of 0.71–0.77 g/cm^3, (1) where in the mass of 1 gallon of gasoline is between 2,687.6 and 2,914.7 grams, (3) with an average molecular weight of gasoline is 108 g/mol and (4) wherein a gallon of gasoline is between 24.8 and 27 moles of gasoline.

On page 4 of the Action, the Examiner states "although the units (ppm vs. grams) of addition may differ, the Examiner is of the position that applicant has not persuasively demonstrated/argued that the amount of 2,2,4-trimethyl-6-ethoxy-1,2-dihydroquinoline stabilizer added to the instant claim differs from that which is taught in the prior art to Reid."

The Applicants have not demonstrated the difference in the amount of 2,2,4-trimethyl-6-ethoxy-1,2-dihydroquinoline stabilizer added to the instant claim differs from that which is taught in the prior art to Reid for the reason exemplified by Assumption #3, Assumption #3 is that the density equation for gasoline is (Density = mass/volume). The material safety data sheet for unleaded gasoline shows **at least fifteen hazardous chemicals occurring in various amounts**, including benzene (up to 5% by volume), toluene (up to 35% by volume), naphthalene (up to 1% by volume), trimethylbenzene (up to 7% by volume), Methyl tert-butyl ether (MTBE) (up to 18% by volume, in some states) and about ten others. This is 15 hazardous chemicals in gasoline; there are more than 15 total chemicals in gasoline. The density equation for a mixture is:

$$\text{Density, } \rho \text{ (mix)} = (n_1 \cdot M_1 + n_2 \cdot M_2 + n_3 \cdot M_3 + n_4 \cdot M_4 + n_5 \cdot M_5 + n_6 \cdot M_6 + n_7 \cdot M_7 + n_8 \cdot M_8 + n_9 \cdot M_9 + n_{10} \cdot M_{10} + n_{11} \cdot M_{11} + n_{12} \cdot M_{12} + n_{13} \cdot M_{13} + n_{14} \cdot M_{14} + n_{15} \cdot M_{15})/V(\text{mix})$$

Where M_1, M_2, M_3, $M_4 \ldots M_{15}$ are the molar masses of the liquid components and n_1, n_2, n_3, $n_4 \ldots . n_{15}$ are the moles of liquid present at a given temperature (**Assumption #6**) and pressure (**Assumption #7**). The more accurate equation is based upon the assumption that there are no more than 15 components in gasoline (**Assumption #8**) with no vapor pressure (**Assumption #9**) and at room temperature (**Assumption #10**). The skilled artisan would readily recognize that gasoline has a vapor pressure at room temperature. Does an open container of gasoline at room temperature produce a smell? To determine 1 to 10,000 ppm additive per gallon of gasoline would require at least ten assumptions. For example, there are at least 15 different components in gasoline. **To arrive at 1 to 10,000 ppm additive per gallon of gasoline without knowing the constituents of gasoline would be impossible without "making-up" numbers or gross guess work.** To make this clear, there are 1 to 10,000 particles of additive for every one million total particles of at least 15 unknown constituents of a mixture. The number of constituents in the mixture is unknown and the amount of each constituent in the mixture is unknown. Since each constituent would have a different weight, a different molar amount or different particle count, how can one of ordinary skill in the art calculate number of grams? The claim ratio in each of the independent claims provides for an additive in gram amounts. How can something be obvious to one of ordinary skill in the art with so much necessary information being unknown to the skilled artisan? For the Examiner to sustain this rejection under 103, the Examiner is essentially taking the position that obviousness can be based upon unknown teachings in the

cited art or that it is proper to reject claims for obviousness because the Examiner guesses or speculates as to how one of ordinary skill in the art would arrive at the claimed invention.

For this reason it is not possible to arrive at a definite amount of 2,2,4-trimethyl-6-ethoxy-1,2-dihydroquinoline in terms of grams. Therefore, it is not possible even if the skilled artisan "makes-up" numbers or guesses about the components of the gasoline mixture to arrive at the claimed invention by reading the Jordan reference (U.S. Patent No. 5,826,369) in combination with Reid (U.S. Patent No. 4,981,495) or Reid (U.S. Patent No. 4,941,968). The above remarks support the remarks made by the Applicant in the previous response which are reproduced below for your convenience.

In *In reKumar*, the Federal Circuit held that to render a later invention (the presently pending application) unpatentable for obviousness, the prior art (U.S. Patent No. 5,826,369; U.S. Patent No. 4,981,495; U.S. Patent No. 4,941,968) must enable a person of ordinary skill in the field **to make and use the later invention** (the presently pending application). *In re Kumar*, 418 F.3d 1361, 76 USPQ2d 1048 (Fed. Cir. 2005). The present disclosure recites ratio in terms of grams per gram and grams per volume which can enable the prior art, but the prior art can **NOT** enable the present invention because it does not provided enough information to adequately establish the claimed ratios.

The Reid reference teaches alkyl 1,2-dihydroquinoline in 1 to 10,000 parts per million of gasoline, and the Jordan reference discloses a weight per volume percent. The skilled artisan would readily recognize the difference between a weight to weight and a particle to particle ratio. While it is quite possible to convert a weight to weight ratio of known compounds with known masses, it is **not** possible to convert a particle to particle ratio without known masses (in particular the known quantities and masses of the constituents of gasoline). Since gasoline is a mixture with an almost unlimited variation of molar ratio's with an equally unlimited variation of masses for its components, it is not possible to infer or deduce the mass and molar composition of gasoline which is needed for the skilled artisan to calculate the weight to weight ratio.

For example, using the claimed weight to weight ratio (from 20:1 to 1:1 of beta-carotene to 2,2,4-trimethyl-6-ethoxy-l,2-dihydroquinoline with the ratio being express as grams). Specifically, 20 grams of beta-carotene to 1 gram of 2,2,4-trimethyl-6-ethoxy-l,2-

dihydroquinoline, the molar ratio (particle to particle ratio) ranges from 10:1 to 1:2. Put another way, for every **ten** beta-carotene particles there is **one** 2,2,4-trimethyl-6-ethoxy-l,2-dihydroquinoline particle which corresponds to the claim limitation "grams of beta-carotene to grams of 2,2,4-trimethyl-6-ethoxy-1,2-dihydroquinoline in the additive is about 20:1" On the other end of the range, for every **one** beta-carotene particles there are **two** 2,2,4-trimethyl-6-ethoxy-l,2-dihydroquinoline particle which corresponds to the claim limitation "grams of beta-carotene to grams of 2,2,4-trimethyl-6-ethoxy-1,2-dihydroquinoline in the additive is about 1:1.

This sort of calculation is not possible using the Reid disclosure. The Reid reference teaches for every 1 million particles of gasoline there will be between 1 to 10,000 particles of alkyl 1,2-dihydroquinoline. There are two issues that prevent the appropriate calculation: (1) what is the mass of the **alkyl** 1,2-dihydroquinoline and (2) what is the mass of the gasoline. Since the term alkyl is a general term, the mass of the alkyl 1,2-dihydroquinoline can to be determined until the alkyl group is defined. Since this group is not defined, it is not possible to calculate the weight (mass) of the alkyl 1,2-dihydroquinoline.

Additionally, the mass of the gasoline is not described in a reasonable way such that the skilled artisan can calculate the mass. To complicate the issue, gasoline is a mixture of chemical components in various amounts with various masses. The amount of each component and the mass of each component must be given in order to calculate the mass of 1 million particle. Since, the chemical components and the amounts of each component present in the gasoline has not been provided, it is NOT possible to calculate the mass of 1 million particles of gasoline which would be necessary to determine the mass.

The Reid reference and the Jordan reference cannot be combined to arrive at the present invention. The Examiners assertion that the ranges expressed in the combination of Reid and Jordan is fundamentally flawed. The Reid reference teaches for every 1 million particles of gasoline there will be between 1 to 10,000 particles of alkyl 1,2-dihydroquinoline. This establishes a molar ratio. Molar ratio's do not account for the weight (mass) of the particles; it only establishes a particle to particle ratio irrespective of weight or volume. A classic example is 55 grams of iron (molecular weight 55.85) to 1 gram of hydrogen (molecular weight 1) give a weight to weight ratio of 55:1, but 55 grams of iron to 1 gram of

hydrogen give a particle to particle ratio of 1:1 (for every particle of iron there is a particle of hydrogen).

Claims 1 and 20 recite the limitation of "wherein a ratio of grams of beta-carotene to grams of 2,2,4-trimethyl-6-ethoxy-1,2-dihydroquinoline in the additive is from about 20:1 to about 1:1", and claims 2 and 21 recite the limitation of "wherein a ratio of a first additive to grams of a stabilizing compound in the additive is from about 20:1 to about 1:1." As the Examiner states on page 2 of the Action, the Jordan reference fails to teach 2,2,4-trimethyl-6-ethoxy-1,2-dihydroquinoline or a stabilizing compound. The Examiner relies on the Reid reference for this teaching. The Reid reference fails to teach beta-carotene. Neither the Jordan reference, the Reid references or the combination of the Jordan and Reid references teach the limitation of "wherein a ratio of a first additive (beta-carotene) to grams of a stabilizing compound (2,2,4-trimethyl-6-ethoxy-1,2-dihydroquinoline) in the additive is from about 20:1 to about 1:1" as recited in the independent claims. Also, neither reference provides either an implicit or explicit teaching, suggestion or motivation for combining a stabilizing compound (2,2,4-trimethyl-6-ethoxy-1,2-dihydroquinoline) with a first additive (beta-carotene). The combination of Jordan and Reid does not account for ***all*** claim limitations. Therefore, the combination of the Jordan and Reid references ***does not*** support a *prima facie* obviousness rejection, and the Applicants respectfully request that the rejection be removed.

If an independent claim is non-obvious under 35 U.S.C. § 103(a), then any claim depending therefrom is by definition non-obvious. Applicant respectfully submits that claims 3-5, 8, 10, 12, 14, 17-19, 22, 23 and 31-33 depend at least in part from independent claims 1, 2, 20 or 21. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the outstanding rejection of claims 1-5, 8, 10, 12, 14, 17-23 and 31-34 under 35 U.S.C. § 103(a) as being unpatentable over Jordan (U.S. Patent No. 5,826,369) in combination with Reid (U.S. Patent No. 4,981,495) or Reid (U.S. Patent No. 4,941,968).

II. Conclusion

In view of the above, applicant believes the pending application is in condition for allowance.

The fee for a Request for Continued Examination (RCE) under 37 C.F.R. § 1.114 is being submitted with this response. Applicant believes no other fee is due; however, if a fee is due, please charge our Deposit Account No. 06-2375, under Order No. HO-P03088US2 from which the undersigned is authorized to draw.

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Respectfully submitted,

By /Leslie Streeter/
Leslie Streeter
Registration No.: 63,221
FULBRIGHT & JAWORSKI L.L.P.
Fulbright Tower
1301 McKinney, Suite 5100
Houston, Texas 77010-3095
(713) 651-5151
(713) 651-5246 (Fax)
Agent for Applicant